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# Course : ROS, Robot Operating System, create robotic applications

*Practical course - 3d - 21h00 - Ref. ROH*
*Price : 2100 € E.T.*

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From its full name Robot Operating System, ROS is today the most widely used framework for creating robotic applications. This training course will enable you to understand its architecture and acquire the skills needed to design robotic applications.

## Teaching objectives

**At the end of the training, the participant will be able to:**

- Understanding the possibilities of ROS and its architecture
- Learn how to use simulators and debugging tools to advance your project
- Setting up autonomous navigation on a mobile robot
- Designing embedded image processing
- Use a robotic arm adapted to your needs

## Intended audience

Various developers, robotics engineers, embedded systems engineers, technical project managers.

## Prerequisites

Good knowledge of Python and C++.

## Course schedule

**PARTICIPANTS**

Various developers, robotics engineers, embedded systems engineers, technical project managers.

**PREREQUISITES**

Good knowledge of Python and C++.

**TRAINER QUALIFICATIONS**

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

**ASSESSMENT TERMS**

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

## 1 Preamble

- Definition of ROS.
- Advantages over other existing solutions.
- Installation and configuration on Ubuntu.
- Presentation of the advantages of Docker encapsulation.
- ROS in an embedded system.

**Hands-on work**
Installing and configuring ROS on Ubuntu.

## 2 The architecture

- File system navigation.
- The notion of package and stack.
- Nodes, topics, services, actions.
- ROS Master and parameter server.

**Hands-on work**
Create packages, nodes, topics, services and actions.

## 3 Simulators

- Presentation of existing simulators.
- Discover Gazebo, a 3D simulator.
- Create objects to be simulated using URDF files.
- Add a URDF file to Gazebo.

**Hands-on work**
Simulate the movement of a robot in a virtual space. Create an object to simulate.

## 4 Debug

- Log messages.
- The various system supervision tools.
- Discover RVIZ.
- Replay scenes with the Bags.

**Hands-on work**
Supervise and replay the movement of a robot in a virtual space.

## 5 Autonomous navigation

- The difference between AGV (Automated Guided Vehicle) and UGV (Unmanned Ground Vehicle).
- Creating a navigation map.
- The concept of AMCL (Adaptive Monte Carlo Localization).
- The concept of SLAM (Simultaneous Localization and Mapping).
- Keywords for autonomous navigation with ROS.
- ROS stack navigation.
- The different configurations to be aware of.

**Hands-on work**
Implementation of autonomous navigation.

**TEACHING AIDS AND TECHNICAL RESOURCES**

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

**TERMS AND DEADLINES**

Registration must be completed 24 hours before the start of the training.

**ACCESSIBILITY FOR PEOPLE WITH DISABILITIES**

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.

### 6 Computer vision

- Overview of the main components used in vision.
- Recover video streams and/or data.
- Overview of the different solutions available for image processing.
- OpenCV and image processing.

**Hands-on work**
Creation of facial recognition.

### 7 Robotic arms

- Presentation of robotic arm selection criteria.
- Mathematical models for arm control.
- Arms for everyone on ROS.
- MoveIt and its architecture.
- Integration of a robotic arm in MoveIt.

**Hands-on work**
Robotic arm control.

## Dates and locations

**REMOTE CLASS**
2026 : 10 June, 21 Oct.

**PARIS LA DÉFENSE**
2026 : 10 June, 21 Oct.